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SEQUENCE LISTING

<110> PRESIDENT AND FELLOWS OF HARVARD COLLEGE

<120> DETECTION AND QUANTIFICATION OF MODIFIED PROTEINS

<130> 56954 PCT (70207)

<140> PCT/US03/07527
<141> 2003-03-11

<150> 60/363,179
<151> 2002-03-11

<160> 57

<170> PatentIn Ver. 2.1

<210> 1
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<220>
<223> Description of Artificial Sequence: Synthetic
6X-His tag

<400> 1
His His His His His His
1 5

<210> 2
<211> 6
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<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
peptide

<400> 2
Gly Phe Thr Ala Leu Lys
1 5

<210> 3
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
peptide

<400> 3
Ala Leu Glu Leu Phe Arg
1 5

<210> 4
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 4
Leu Phe Thr Gly His Pro Glu Thr Leu Glu Lys
1 5 10

<210> 5
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic peptide

<400> 5
Ile Arg Asn Pro Asp
1 5

<210> 6
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic His tag

<220>
<221> misc_feature
<222> (6)..(10)
<223> This region may encompass 6-10 residues

<400> 6
His His His His His His His His His
1 5 10

<210> 7
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Exemplary sequence of a signature peptide produced by trypsin proteolysis

<400> 7
Leu Ile Phe Ala Gly Lys Gln Leu Glu Asp Gly Arg
1 5 10

<210> 8
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 8
Met Pro Phe Ile Thr Ser Arg Pro Val Ala Lys Asn Ser Ser His Ser
1 5 10 15

Leu Ser Glu Thr Asp Leu Asn Gln Ser Lys Gly Gln Pro Phe Gln Pro
20 25 30

Ser Pro Thr Lys Lys Leu Gly Ser Met Gln Gln Arg Arg Arg Ser Ser
35 40 45

Thr Ile Arg His Ala Leu Ser Ser Leu Leu Gly Gly
50 55 60

<210> 9
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 9
Ala Asn Val His Ser Pro Ala Val Leu Asn Asn Thr Thr Lys Gly Gly
1 5 10 15

Asn Asn Asn Gly Asn Ile Arg Ser Ser Asn Thr Asp Ala Gln Leu Leu
20 25 30

Gly Lys Lys Gln Asn Lys Gln Pro Pro Pro Asn Ala Arg Arg His Ser
35 40 45

Thr Thr Ala Ile Gln Gly Ser Ile Ser Asp Ser Ala
50 55 60

<210> 10
<211> 60
<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 10

Thr Thr Thr Pro Arg Ser Ser Thr Ser Asp Thr Asn Arg Arg Thr Ser
1 5 10 15Gly Arg Leu Ser Val Asp Gln Glu Pro Arg Ile Ser Gly Gly Arg Tyr
20 25 30Ser Gln Ile Glu Glu Asp Ser Thr Val Leu Asp Phe Asp Asp Asp His
35 40 45Asn Ser Ser Ala Val Val Ser Ser Asp Leu Ser Ser
50 55 60

<210> 11

<211> 60

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 11

Thr Ser Leu Thr Arg Leu Ala Asn Ser Lys Lys Phe Asn Glu Gln Phe
1 5 10 15Leu Ile Glu Tyr Leu Thr Ala Arg Gly Leu Leu Gly Pro Lys Thr Val
20 25 30Leu Ser Asn Glu Tyr Leu Lys Ile Ser Ile Ser Thr Ser Gly Glu Ser
35 40 45Val Phe Leu Pro Thr Ile Ser Ser Asn Asp Asp Glu
50 55 60

<210> 12

<211> 60

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 12

Tyr Leu Ser Arg Leu Asn Gly Leu Asn Asp Gly Thr Asp Asp Ala Glu
1 5 10 15Ala Asp Phe Phe Met Asp Gly Ile Asp Gln Gln Glu Gly Asn Thr Pro
20 25 30

Ser Leu Ala Thr Thr Ala Ala Ala Thr Glu Ser Gly Gly Ser Ile Asn
35 40 45

Glu Asn Arg Asp Thr Leu Leu Arg Glu Asn Asn Ser
50 55 60

<210> 13
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 13
Gly Asp His Pro Gly Ser Gly Ser Glu Leu Asn Thr Arg Ser Val Glu
1 5 10 15

Ile Asp Ser Ser Met Val Ser Tyr Ser Ile Ala Val Ile Val Ser Val
20 25 30

Lys Lys Pro Thr Arg Phe Thr Asp Met Gln Leu Glu Leu Cys Ser Arg
35 40 45

Val Lys Val Phe Trp Asn Thr Gly Val Pro Pro Thr
50 55 60

<210> 14
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 14
Lys Thr Phe Asn Glu Glu Phe Tyr Asn Ala Ala Ser Met Lys Trp Asn
1 5 10 15

Leu Asn Asp Glu Asn Phe Asp Leu Phe Val Pro Leu Ser Ile Ser Pro
20 25 30

Asp Ile Asp Gln Met Glu Asn Asn Ser Asn Asp Arg Gln Met Arg Leu
35 40 45

Phe Lys Asn Ile Pro Thr Glu Glu Arg Leu Tyr Leu
50 55 60

<210> 15
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 15
Asp Lys Thr Lys Thr Lys Ala Ser Leu Leu Asn Ala Ile Asp Val Asn
1 5 10 15

Lys Thr His Leu Tyr Gln Pro Gly Asp Tyr Val Phe Leu Val Pro Val
20 25 30

Val Phe Ser Asn His Ile Pro Glu Thr Ile Tyr Leu Pro Ser Ala Arg
35 40 45

Val Ser Tyr Arg Leu Arg Leu Ala Thr Lys Ala Ile
50 55 60

<210> 16
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 16
Asn Arg Lys Gly Phe Tyr Arg Gln Asp Ser Asn Ser Pro Gln Pro Ile
1 5 10 15

Val Ser Pro Asp Ser Ser Ser Leu Ser Ser Thr Thr Ser Ser Leu
20 25 30

Lys Leu Thr Glu Thr Glu Ser Ala Gln Ala His Arg Arg Ile Ser Asn
35 40 45

Thr Leu Phe Ser Lys Val Lys Asn His Leu His Met
50 55 60

<210> 17
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 17
Ser Ser His Gln Leu Lys Asn Glu Glu Ser Gly Glu Glu Asp Ile Phe
1 5 10 15

Ala Glu Tyr Pro Ile Lys Val Ile Arg Thr Pro Pro Pro Val Ala Val
20 25 30

Ser Thr Ala Asn Lys Pro Ile Tyr Ile Asn Arg Val Trp Thr Asp Ser
35 40 45

Leu Ser Tyr Glu Ile Ser Phe Ala Gln Lys Tyr Val
50 55 60

<210> 18
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 18
Ser Leu Asn Ser Glu Val Pro Ile Lys Ile Lys Leu Ala Pro Ile Cys
1 5 10 15

Lys Asn Val Cys Val Lys Arg Ile His Val Ser Ile Thr Glu Arg Val
20 25 30

Thr Phe Val Ser Lys Gly Tyr Glu Tyr Glu Tyr Asp Gln Thr Asp Pro
35 40 45

Val Ala Lys Asp Pro Tyr Asn Pro Tyr Tyr Leu Asp
50 55 60

<210> 19
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 19
Phe Ala Ser Lys Arg Arg Lys Glu Arg Ser Val Ser Leu Phe Glu Ile
1 5 10 15

Arg Thr Lys Glu Lys Gly Thr Arg Ala Leu Arg Glu Glu Ile Val Glu
20 25 30

Asn Ser Phe Asn Asp Asn Leu Leu Ser Tyr Ser Pro Phe Asp Asp Asp
35 40 45

Ser Asp Ser Lys Gly Asn Pro Lys Glu Arg Leu Gly
50 55 60

<210> 20
<211> 60
<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 20

Ile Thr Glu Pro Ile Ile Glu Thr Lys Leu Lys Phe Pro Lys Tyr
1 5 10 15Glu Asp Leu Asp Lys Arg Thr Ala Lys Ile Ile Pro Pro Tyr Gly Ile
20 25 30Asp Ala Tyr Thr Ser Ile Pro Asn Pro Glu His Ala Val Ala Asn Gly
35 40 45Pro Ser His Arg Arg Pro Ser Val Ile Gly Phe Leu
50 55 60

<210> 21

<211> 60

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 21

Ser Gly His Lys Gly Ser Lys Ser His Glu Glu Asn Glu Lys Pro Val
1 5 10 15Tyr Asp Pro Lys Phe His Gln Thr Ile Ile Lys Ser Asn Ser Gly Leu
20 25 30Pro Val Lys Thr His Thr Arg Leu Asn Thr Pro Lys Arg Gly Leu Tyr
35 40 45Leu Asp Ser Leu His Phe Ser Asn Val Tyr Cys Arg
50 55 60

<210> 22

<211> 60

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 22

His Lys Leu Glu Ile Met Leu Arg Ile Ser Lys Pro Asp Pro Glu Cys
1 5 10 15Pro Ser Lys Leu Arg His Tyr Glu Val Leu Ile Asp Thr Pro Ile Phe
20 25 30

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Leu Val Ser Glu Gln Cys Asn Ser Gly Asn Met Glu Leu Pro Thr Tyr
35 40 45

Asp Met Ala Thr Met Glu Gly Lys Gly Asn Gln Val
50 55 60

<210> 23
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 23
Pro Leu Ser Met Asn Ser Asp Phe Phe Gly Asn Thr Cys Pro Pro Pro
1 5 10 15

Pro Thr Phe Glu Glu Ala Ile Ser Val Pro Ala Ser Pro Ile Val Ser
20 25 30

Pro Met Gly Ser Pro Asn Ile Met Ala Ser Tyr Asp Pro Asp Leu Leu
35 40 45

Ser Ile Gln Gln Leu Asn Leu Ser Arg Thr Thr Ser
50 55 60

<210> 24
<211> 60
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 24
Val Ser Gly Pro Ser Gly Tyr Ser Asp Asp Ala Gly Val Pro Asn Val
1 5 10 15

Asn Arg Asn Ser Ile Ser Asn Ala Asn Ala Met Asn Gly Ser Ile Ser
20 25 30

Asn Ser Ala Phe Val Ser Gly Asn Ser Gly Gln Gly Val Ala Arg Ala
35 40 45

Arg Ala Thr Ser Val Asn Asp Arg Ser Arg Phe Asn
50 55 60

<210> 25
<211> 60
<212> PRT
<213> Artificial Sequence

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<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 25

Asn Leu Asp Lys Leu Leu Ser Thr Pro Ser Pro Val Asn Arg Ser His
1 5 10 15

Asn Ser Ser Pro Thr Asn Gly Leu Ser Gln Ala Asn Gly Thr Val Arg
20 25 30

Ile Pro Asn Ala Thr Thr Glu Asn Ser Lys Asp Lys Gln Asn Glu Phe
35 40 45

Phe Lys Lys Gly Tyr Thr Leu Ala Asn Val Lys Asp
50 55 60

<210> 26

<211> 37

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
poly-ubiquitinated polypeptide

<400> 26

Asp Glu Glu Gln Glu Gly Ile Val Ser Ser Ser Ala Asp Ser Leu
1 5 10 15

Leu Ser His Gly Asn Glu Pro Pro Arg Tyr Asp Glu Ile Val Pro Leu
20 25 30

Met Ser Asp Glu Glu
35

<210> 27

<211> 12

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
signature peptide

<400> 27

Leu Ile Phe Ala Gly Lys Gln Leu Glu Asp Gly Arg
1 5 10

<210> 28

<211> 18

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
signature peptide

<400> 28

Thr Leu Ser Asp Tyr Asn Ile Gln Lys Glu Ser Thr Leu His Leu Val
1 5 10 15

Leu Arg

<210> 29

<211> 21

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
signature peptide

<400> 29

Thr Leu Thr Gly Lys Thr Ile Thr Leu Glu Val Glu Ser Ser Asp Thr
1 5 10 15Ile Asp Asn Val Lys
20

<210> 30

<211> 18

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
signature peptide

<400> 30

Thr Ile Thr Leu Glu Val Glu Ser Ser Asp Thr Ile Asp Asn Val Lys
1 5 10 15

Ser Lys

<210> 31

<211> 19

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
signature peptide

<400> 31

Leu Ile Ser Glu Glu Asp Leu Gly Met Gln Ile Phe Val Lys Thr Leu
1 5 10 15

Thr Gly Lys

<210> 32
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 32
Ala Val Ser Val Ser Asp Leu Ser Tyr Val Ala Asn Ser Gln Ser Ser
1 5 10 15

Pro Leu Arg

<210> 33
<211> 18
<212> PRT
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<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 33
Gly Ser Gly Gly Thr Ser Glu Leu Gly Gly Ser Glu Ser Thr Pro Leu
1 5 10 15

Leu Arg

<210> 34
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 34
Asp Glu Asn Asp Gly Tyr Ala Ser Asp Glu Val Gly Gly Thr Leu Ser
1 5 10 15

Arg

<210> 35
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 35
Asp Asp Glu Tyr Asp Asp Leu Asn Thr Ile Asp Lys
1 5 10

<210> 36
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 36
Asn Pro Ser Thr Leu Leu Pro Thr Ser Ser Met Phe Trp Asn Lys
1 5 10 15

<210> 37
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 37
Asn Glu Glu Ser Gly Glu Glu Asp Ile Phe Ala Glu Tyr Pro Ile Lys
1 5 10 15

<210> 38
<211> 23
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 38
His Ala Leu Ser Ser Leu Leu Gly Gly Ala Asn Val His Ser Pro Ala
1 5 10 15

Val Leu Asn Asn Thr Thr Lys
20

<210> 39
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 39
Arg Pro Ser Val Ile Gly Phe Leu Ser Gly His Lys
1 5 10

<210> 40
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 40
Ser His Asn Ser Ser Pro Thr Asn Gly Leu Ser Gln Ala Asn Gly Thr
1 5 10 15

Val Arg

<210> 41
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 41
Glu Glu Ile Asp Ser Glu Phe Glu Asp Glu Asp Phe Glu Lys
1 5 10

<210> 42
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 42
Ala Ser Gly Glu Thr Ala Ile His Glu Pro Glu Pro Glu Ala Glu Gln
1 5 10 15

Ala Val Glu Asp Thr Ala
20

<210> 43
<211> 22

<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 43
Leu Gln Val Val Ser His Glu Thr Asp Ile Asn Glu Asp Glu Glu Glu
1 5 10 15

Ala His Tyr Glu Asp Lys
20

<210> 44
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 44
Lys Tyr Ser Asp Asn Glu Asp Asp Glu Tyr Asp Asp Ala Asp Leu His
1 5 10 15

Gly Phe Glu Lys
20

<210> 45
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 45
Arg Gly Ser Val Tyr His Val Pro Leu Asn Pro Val Gln Ala Thr Ala
1 5 10 15

Val Arg

<210> 46
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 46
Ile His Asp Thr Ser Asp Glu Asp Met Ala Ile Asn Gly Leu Glu Arg
1 5 10 15

<210> 47
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 47
Asn Asn Asp Ile Glu Ser Ser Ser Pro Ser Gln Leu Gln His Glu Ala
1 5 10 15

<210> 48
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 48
Ser Val Asn Tyr Asn Glu Leu Ser Asp Asp Asp Thr Ala Val Lys
1 5 10 15

<210> 49
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 49
Thr Leu Ser Asp Tyr Asn Ile Gln Lys
1 5

<210> 50
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 50
Ile Glu Glu Ile Asn Glu Asn Ser Pro Leu Leu Ser Ala Pro Ser Lys
1 5 10 15

<210> 51
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 51
Thr Asn Ser Phe Asp Met Pro Gln Leu Asn Thr Arg
1 5 10

<210> 52
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 52
Glu Thr Val Asp Asp Asp Ser Glu Thr Leu Asn Gln Leu Gln Asp Arg
1 5 10 15

<210> 53
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 53
Leu Pro Ser Tyr Glu Glu Ala Ala Gly Thr Pro Lys
1 5 10

<210> 54
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 54
Lys Asn Pro Asp Glu Asp Glu Phe Leu Ile Asn Ser Asp Asp Glu Met
1 5 10 15

<210> 55
<211> 29
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 55
Ser Ser Gly Ile Asp Glu Asp Glu Val Val Thr Pro Ala Glu Asp Ala
1 5 10 15

Lys Glu Glu Glu Glu His Pro Pro Leu Pro Ala Arg
20 25

<210> 56
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 56
Glu Gln His His Glu Asp Ser Glu Glu Asp Ser Trp Ser Gln Phe
1 5 10 15

Val Glu Lys

<210> 57
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Synthetic
phosphopeptide sequence

<400> 57
His Val Ile Ala Asp Leu Glu Asp His Glu Ser Ser Asp Glu Glu Gly
1 5 10 15

Thr Ala Leu Pro Lys
20